

strength uniform throughout. The stone operated upon in these experiments was a very hard kind, found in the vicinity of Manchester.

The sum of 60*l.* was afterwards voted to Mr. Hodgkinson for the prosecution of further experiments.

Coloured Glass.—Prof. Playfair, in the absence of Prof. Graham, communicated the results of some experiments on coloured glass, by Mr. Splitgerber, and exhibited some specimens of white glass, containing gold, which coloured a deep red on the application of a certain heat, and loses this colour, though not entirely, on being heated to a point approaching fusion.

Production of Iron in Scotland.—Dr. Watt read a paper on the production of iron in Scotland. This paper showed the improved state of the iron trade in Scotland, the increase of new works and additional furnaces, with every probability of continued prosperity. Dr. Watt stated that it required a million tons of coals to produce 400,000 tons of iron.

Mr. Porter said that in the iron works in Great Britain, for one year, 1,396,400 tons of iron were made from 4,877,000 tons of coals; this showed a discrepancy according to the statement of Dr. Watt.

Prof. Pryme thought the discrepancy might arise in part from the impurity of the iron; upon the purity of which a good deal depended as to the quantity of coals required.

A member said the introduction of hot blast had made considerable alteration in the iron works in Scotland. It now took seven tons of coals to make one ton of iron; consequently, the iron works were regarded as hardly profitable; but by the hot blast, the average of coal is about 2½ tons to the ton of iron; and the profits of iron works have risen in proportion. The refuse of coal, or small dust, which cost nothing, was used for hot blasting, and was not counted in the weight.

Mr. Porter, in alluding to the requirements upon the iron works, said there was one district of railway now before the House which was calculated to require 851,000 tons of iron. Our export trade in iron had also become of immense magnitude. In 1843, there was exported 460,000 tons of iron, and the use of this metal would be greatly on the increase if its price were kept moderate, as it was much used in the building of steamers, and found to answer well. One person had forty-five iron steamers in England, and another gentleman had informed him that he had had an iron steamer in constant use twenty-five years, and that it had not cost 50*l.* for repairs the whole period, nor had it been laid up a week.

Railway Gradients.—Mr. Fairbairn read a paper on the improvement which had been effected in railway gradients, from which we take the following tables:—

TABLE OF ATMOSPHERIC RESISTANCE.

20 miles an hour.....	107
22.....	130
24.....	155
26.....	182
30.....	211

RESISTANCES AT THIRTY-THREE MILES AN HOUR.

Gradients.	Force of friction in per ton.	Gravity in per ton.
1 in 20.....	25	11,206
1 in 30.....	25	7,466
1 in 40.....	25	5,600
1 in 60.....	25	3,733

The President said that, by these improvements, railroad companies would be enabled to lay out their money more economically on engines of greater power, and the stationary ones might be done away with.

A member stated that the single lines were now coming into use (as in the Peterborough Railroad), with the electric telegraph, protected by which they were safer than the double ones. Looking at the saving of human life, this was a question of the deepest interest; and if, as on the Great Western, the electric telegraph were destroyed by the collision, there might be a second telegraph on the other side, to be worked in case of such accident taking place. In a pecuniary point of view, at this moment, when millions were about to be laid out on new lines, the improvements brought before the section were of the greatest importance.

Steam Pile-driving Machine.—Dr. Greene read an interesting paper on the Steam Pile-driving Machine, recently invented by Mr.

Nasmyth, of Plymouth. At the last meeting of the Association the steam hammer, invented by the same gentleman, was brought before the consideration of the mechanical section, and received its approval. The new instrument, which had only been put together within the last few days, depended much upon the steam hammer. It consisted of two uprights, each 80 feet high, such height being necessary, in consequence of the immense piles it had to take up and drive into the sea. These uprights were parallel to each other. There was a cap in the middle, through which the pile went, and the piston moved in the cylinder upwards by the force of high-pressure steam. It was self-propelling, and moved on a railway. Dr. Greene was happy to be enabled to state to the section, that he had received a letter, a day or two back, from Mr. Nasmyth, stating that he had just completed the instrument, and tried it, with the most signal success. The first pile driven down by it—and this into a bed of hard yellow clay—was 14 inches square, and 18 feet in length, and was done so in the space of 17 seconds. "It was truly laughable," said Mr. Nasmyth in his letter, "to see this gigantic machine running along, picking one monstrous pile after another, and driving them into the earth with as much ease, and almost as quickly, as a lady would stick pins into a pin cushion." Dr. Greene exhibited the drawing of two piles—one bent, crooked, and split, after having been driven into the earth by the old method, with 20 hours' labour—and the other perfectly whole, after having been sent down by the new instrument in the incredibly short space of 4½ minutes. The advantages of such an enormous power, he said, were incalculable in the saving of time, labour, and capital; and we should reap the benefit of them in all directions where great national works were going on, and especially in the formation of the harbours of refuge along our coast, and recovering land from the sea. The Embankment at Devonport had a stubborn sea to contend against; and it was calculated that it required even yet 30,000 piles to be driven down to complete it, in which case the power and advantage of Mr. Nasmyth's invention would be at once felt and acknowledged. One of the Lords of the Treasury had been very recently in his neighbourhood, and having seen the instrument tried, expressed his approval of it; and he (Dr. Greene) was happy to add, the inventor received an excellent Government appointment. Mr. Nasmyth, when his principle of the steam hammer was primarily developed, never anticipated that he should ever be enabled to carry it out to such a wonderful extent as he had succeeded in doing in the space of twelve months. The weight had been at first about from four to five tons; but it was subsequently found that this was a great waste of power, and that one-fourth of it was all that was required. The face of the hammer was parallel with the face of the anvil, and its power of sustenance was wonderful. When tried the other day, Mr. Nasmyth, to prove this feature the more satisfactorily to some persons who went to see the instrument tried in all respects, said it should crack a walnut without crushing the kernel; but the walnut not being at hand, one of the workmen offered a small tin snuff-box, which being placed open under the hammer, the lid was delicately shut down, without ding or injury.

Mr. Fairbairn testified to the powers of this wonderful hammer, having seen it tried. The velocity was in the ratio of the force of the steam; it might be made to strike from four to five hundred blows a minute.

The President said that he had had some experience in pile-driving at Sheerness and the London bridge, and he could safely say that it took more hours to drive down a pile by the old method than minutes by the proposed one. He congratulated the section on what they had just heard; and he thought the lovers of science, and the country in general, were much indebted to Mr. Nasmyth.

The next meeting of the Association will be held in Southampton; Mr. Murchison is elected president.

IMPROVEMENT AT DARWEN.—Mr. Eccles Shorrocks intends to build, at his own expense, a spacious covered market-house, and Mechanics' Institution, at Darwen.

DECORATIVE ART SOCIETY.

On Wednesday, 25th ult., the consideration of "Geometrical figures as the foundation of graceful outline," was resumed with more especial reference to the "properties of the oval."

From observations of the works of the Ancient Egyptians and Greeks, it was considered that those nations were acquainted with a practical method of producing continuous curves which is not apparent in either Roman or modern art. The elliptical lines on which the beautiful outlines of the Etruscan vases were founded were supposed to have been selected from a series produced by some simple and convenient system, and are not to be altogether ascribed to the greater perfection of their skill in design.

An approximation to the forms of the ancient vases may be undoubtedly produced by mathematical arrangements of straight lines and segments of circles, as was shown, but such systems were considered to be necessarily complex and untidied with that practical accuracy and freedom observable in the originals. The defects of our practice were instanced in the Tudor-arched heading of the windows to the new Palace of Westminster, where an approximation only to the beauty of a curved line is attained.

It was also argued that curves based on hexagonal proportions were the most graceful, and Mr. Japling partially explained the "septyenary system of generating curves by continued motion" through combinations of rotatory movements with those of an ordinary treadmill as invented by himself, and he exhibited drawings that certainly appeared to possess a variety, precision, and accuracy, much to be desired; he also affirmed, that for practical purposes, the expense of a couple of shillings would supply a workman with means to produce correctly any curve that might be required.

The discussion of this subject will be resumed on the 30th July, when the merits of Mr. Japling's septyenary system and the principles of spiral or serpentine lines will be considered.

ART-UNIONS.

A bill has been introduced into the House of Commons, by Messrs. Wyse and Ewart, for turning so much of the laws against distribution by lottery as may legalize the proceedings of Art-Unions. Reciting the recent circumstances in the history of these institutions, the bill enacts that all such voluntary associations for the purchase of paintings, drawings, &c., to be afterwards allotted by chance, now constituted, or which may hereafter be so, shall be deemed and taken to be lawful associations, provided always "that a royal charter or charter shall have been first obtained for the incorporation of such associations, or, provided that the deed of partnership or other instrument or instruments constituting such associations, and the rules and regulations relating to the proceedings of such associations for such purposes as aforesaid, shall have first been submitted to the consideration, and be approved of, by a committee of her Majesty's most honourable Privy Council, and a copy thereof deposited with such committee; and provided such proceedings for such purposes as aforesaid shall have been conducted in strict conformity with the royal charter or charters which may have been granted, or the deed of partnership, or other instrument or instruments constituting such association, and the rules and regulations which may have been approved of, as hereinbefore set forth."

The newspapers, in mentioning this provision in the bill, have all stopped short at the royal charter, and omitted the alternative, which is of considerable importance.

FALL OF A WALL, AND FATAL RESULT.

Last Saturday afternoon about 30 feet in length of a wall, bounding the premises of Mr. Davies, an emery manufacturer, in Richardson street, Bermondsey, was thrown down, in consequence of 100 tons of emery stones being piled against it. The wall was 10 feet in height, and 9 inches in thickness. Several children were playing near the spot, and one was crushed to death, while three others received severe injury.